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Fertig, Michael

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The Effectiveness of Qualification Measures for Employed Workers – An Evaluation Study for Saxony

Michael Fertig
RWI-Essen and IZA-Bonn

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Abstract. This paper investigates whether and to what extent employment policy measures (co-) financed by the *European Social Fund* in Germany meet their objective. Specifically, it is analyzed whether qualification programs for employed workers in the German state of Saxony were effective in terms of employment protection. To this end, a control function approach is implemented which utilizes a unique firm-level dataset. This model explicitly accounts for unobserved heterogeneity between participating and non-participating companies by modeling the participation decision process. Our results suggest a positive effect of program participation. However, this positive treatment effect varies considerably across different sub-groups of the treatment as well as the comparison group.

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1. Introduction

At the Luxembourg Jobs summit in November 1997 the European Commission initiated a set of coordinated policies which have become known as the *Luxembourg Process.* The *Amsterdam Treaty* introduced a new *Employment Title* and thus raised employment issues to the same status as other key goals in the formulation of EU economic policy. This treaty represents a major step in the development of a comprehensive European approach to labor market policy, the *European Employment Strategy.* Active labor market policies (ALMP) – including job search assistance, subsidized training and direct job provision in the public sector – are an important element of this European Employment Strategy. While such policies have been in use for many years, unemployment still remains persistently high throughout most European countries, raising the question as to the actual effect of employment promotion.

An interesting example in this context is Germany. Every year Germany spends several billions of Euro on active measures of employment promotion with the explicit aim to reduce unemployment (see FERTIG AND SCHMIDT (2000)). However, unemployment has been a persistent problem throughout the last two decades and until today only insufficient systematic attempts to evaluate the effectiveness and efficiency of these measures have been undertaken. Recently, inspired by a growing body of international evaluation literature (see e.g. the pioneering work of RUBIN (1974), (1986)), a handful of studies evaluate the labor market impact of some measures of active labor market policy (mainly training measures) implemented in the context of and financed by German labor laws (*Sozialgesetzbuch III*)[1]. The evidence of these studies concerning the efficacy of active labor market policy interventions is rather mixed. Most of them, as well as the

[1] See e.g. FITZENBERGER AND PREY (2000), HÜBLER (1997), HUJER ET AL. (1999), LECHNER (1998), (1999) and (2000). KLUVE AND SCHMIDT (2002) provide an overview for Europe.

majority of the international studies, show a rather small, if any, positive effect of employment promotion measures on the individual level[2].

Rather neglected so far by the existing evaluation literature are measures of active labor market policy initiated and (co-) financed by the European Union. Against the background of the substantial amount of money disbursed among the Member States by the Structural Funds of the EU each year (for more details see **section 2**), the missing evidence on the effectiveness and efficiency of such measures is rather striking. Clearly, without such evidence it is impossible to identify successful initiatives and to uncover ineffective measures.

Thus, this paper contributes to the literature by investigating whether and to what extent employment policy measures initiated in the context of and (co-) financed by the *European Social Fund* (ESF) in Germany meet their objective. Specifically, it is analyzed whether qualification programs for *employed* workers in the German state of Saxony, which were targeted at small and medium-sized enterprises rather than individual employees, were effective in terms of employment protection. To this end, we implement a control function approach (see HECKMAN (1979)) utilizing a unique firm-level dataset. This model explicitly accounts for unobserved heterogeneity between participating and non-participating companies by modeling the participation decision process.

The rest of the paper is organized as follows. **Section 2** provides a brief description of the intervention under investigation, i.e. ESF-funded qualification measures for employed

[2] Only a small number of studies addresses the efficacy of ALMP on the aggregate level (see e.g. CALMFORS AND SKEDINGER (1995) for Sweden or FERTIG ET AL. (2002) and HUJER ET AL. (2002) for Germany).

workers. **Section 3** explains the conceptual framework of the evaluation study and the identification strategy utilized. In **section 4** the dataset as well as the empirical results are presented and **section 5** offers some conclusions regarding the policy implications of the analysis conducted here.

2. ESF-Funded Qualification Measures for Employed Workers

The *European Social Fund* (ESF) is the second largest of the four *Structural Funds* in the European Union[3]. The *Structural Funds* are the main financial instruments of the EU aiming at the reduction of the gap in living standards between regions and to the general promotion of economic and social cohesion within the EU. They are supposed to achieve at least one of several objectives. With the reform of 1999 the number of objectives was reduced from seven to three. For the case at hand, the relevant objective is *Objective 1*. This objective mainly aims at promoting regions where GDP *per capita* is below 75% of the EU average. It is financed by all four structural funds and accounts for around 70% of total Structural Funds spending.

Regarding ESF activities, there are five main areas or policy fields: (i) developing and promoting active labor market policies, (ii) promoting equal opportunities for all in accessing the labor market, (iii) promoting and improving training, education and counseling as part of a life-long learning policy, (iv) promoting a skilled, trained and adaptable workforce, and (v) improving women's access to and participation in the labor market. Irrespective of the activity area, a principal requirement for ESF-funding is the availability of matching funds at the national, regional or community level.

[3] The other three structural funds are the European Regional Development Fund (ERDF), the Financial Instrument of Fisheries Guidance (FIFG) and the European Agricultural Guidance and Guarantee Fund (EAGGF).

Specifically, the ESF complements activities of the Member States in these policy fields by supporting the so-called National Action Plans for Employment, set up by the Member States every year as a part of the European Employment Strategy. The principle of joint financing (or co-funding), i.e. the requirement that the financial resources provided by the ESF have to be complemented by resources from the Member States, allows the Member States to supplement their own labor market policy measures by other initiatives according to EU guidelines. For instance, in Germany these resources were used to support labor market policy measures which are outside the realm of national labor laws, like qualification measures for *employed* workers.

In the period from 1994 to 1999, Germany[4] received more than 7,400 Mio. ECU from the ESF for all objectives. Some 57% of these funds were allocated to *Objective 1*. From this pool, the *Objective* 1 region of Saxony received around 906 Mio. € which were mainly spent for vocational and further training measures for employed as well as unemployed workers. Together with own financial contributions, total spending in Saxony amounted to more than 1,400 Mio. € during this time period.

In this paper, the effectiveness of qualification measures for *employed* workers is under investigation. This ESF-(co-)funded program explicitly aims at increasing the competitiveness of companies, secure existing jobs and create new employment opportunities. Funding is provided to institutions offering qualification measures (*Maßnahmeträger*). This follows the idea that these institutions design their qualification measures in close co-operation with companies interested in training their employees.

[4] See http://europa.eu.int/comm/employment_social/esf/en/member/ms/germany/gersf.htm.

Some 80% of the costs of such measures are refunded from public resources (of which 65% are from ESF-funds and 35% are co-funding from the state of Saxony) and 20% have to be borne by participating companies.

These measures are originally targeted at small and medium sized enterprises (less than 250 employees). However, there were also larger firms among the participating companies. Furthermore, from the survey among companies – which was conducted for the purpose of evaluation – it became transparent that some of them were not actively involved in the participation of their employees in these qualification measures. Those companies which participated actively did so in several forms. For instance, qualification measures for their employees comprise external and internal courses/seminars, qualification at the workplace (training-on-the-job), participation in workshops or conferences as well as self-controlled learning utilizing new media.

The ESF-funded measures of active labor market policy were implemented in an environment which was characterized by only moderate growth rates of real GDP (see **Table 1**). On average, in the second half of the 1990s the growth rate of real GDP in Saxony was around 2% per annum with stagnation in 1997 and 1998. Furthermore, **Table 1** demonstrates that Saxony experienced a small loss of people during this period and relatively constant total employment.

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Table 1: Key Characteristics of Saxony During Funding Period

	Total population (in 1,000)	Total employment (in 1,000)	GDP in prices of 1995 (in Bn. €)	Growth rate of real GDP (in %)
1995	4,575	1,997	67.0	5.7
1996	4,556	1,998	68.9	2.9
1997	4,536	1,971	68.9	-0.1
1998	4,506	1,970	68.8	-0.1
1999	4,475	1,984	70.2	2.0
All years (average):	**4,530**	**1,984**	**68.8**	**2.1**

Data source: Statistisches Landesamt Sachsen.

From **Table 2** it becomes transparent that unemployment rates were substantial and persistently high during the second half of the 1990s. On average, the number of registered unemployed relative to the civilian labor force amounted to more than 17%. Furthermore, unemployment was almost constantly rising during these years and the share of registered unemployed with an unemployment spell of more than 12 months (long-term unemployed) was almost one third.

Table 2: Labor Market Characteristics in Saxony During the Funding Period

	Unemployment rate (in %)	Long-term unemployed in % of all unemployed	Number of workers in ALMP measures	Number of workers in early retirement scheme
1995	14.4	30.6	156,095	117,607
1996	15.9	28.0	137,910	68,450
1997	18.4	27.6	112,985	44,652
1998	18.8	33.5	125,437	32,007
1999	18.6	33.7	130,763	29,568
All years (average):	**17.2**	**30.7**	**132,638**	**58,457**

Data source: Statistisches Landesamt Sachsen and Sächsisches Ministerium für Wirtschaft und Arbeit.

In addition to the substantial number of registered unemployed, a considerable share of workers were participating in measures of active labor market policy, like public

employment schemes and long-term training measures, and early retirement schemes. Since these workers are not registered as unemployed, the genuine number of workers out of employment was substantially higher. On average, more than 190,000 individuals participated in such measures/schemes during 1995-1999.

The program which is under investigation in this paper is somewhat different from these measures. It is targeted at small- and medium-sized companies with the explicit aim to train their existing workforce. In this endeavor, the primary objective was to secure their jobs. Against the background of the rather disillusioning macroeconomic and labor market situation in Saxony during this time, the question, whether the program succeeded as an employment protection measure will be tackled in the next sections.

3. The Conceptual Framework for Evaluation

To conceptualize ideas, it is helpful to embed our study into the received literature on the evaluation of public interventions. Key element of any evaluation study is the *counterfactual question* "What would have happened to a suitably defined outcome measure if the intervention had not taken place?" Clearly, the implied *counterfactual situation* is unobservable. To this end we would have to observe the participating firms after the treatment period both with and without treatment. The latter situation is unobservable. This central evaluation problem induces the necessity to construct an observable counterpart for this unobservable situation by invoking suitable *identification assumptions*. These assumptions have to hold *a priori* since they are not statistically testable. Their validity, which has to be judged upon economic reasoning alone, however, is decisive for the validity of the derived results.

In the modern literature on the evaluation of public interventions (see e.g. HECKMAN ET AL. (1999)) *matching* estimators are the most prominent identification strategy. Yet, the central problem of such non-parametric identification strategies is that they are very data demanding and that they rest upon the so-called *conditional independence assumption* (CIA) or ignorability (see ROSENBAUM AND RUBIN (1983)). This means that conditional on observable characteristics, treatment and comparison groups do not differ in any dimension (relevant for the outcome) other than the treatment itself. In other words, there is no unobserved heterogeneity between both groups. Typically, evaluation studies on the level of e.g. individual workers justify this assumption by controlling for the history of the outcome measure prior to the intervention (pre-treatment outcomes). If both groups differ in unobserved characteristics then this should be reflected in the values of the outcome measure prior to treatment as well. These pre-treatment outcomes can then serve as a proxy for unobserved characteristics provided that these characteristics remain persistent over time and thus repeated measurement of the outcome variable reveals information about them.

In the case at hand, the data set comprises information on the *companies* participating in qualification measures for their employees since the program was explicitly targeted at small and medium-sized enterprises. Therefore, unobserved heterogeneity might well be a severe problem, since at the level of firms potentially important characteristics like the innovative potential of the management or the motivation of the workforce remain unobserved. If these unobserved characteristics exhibit an impact on the probability to participate in qualification measures and also impinge upon the outcome variable, the estimated treatment effect is biased.

An example might be companies in which the management's unobservable innovative capacity is larger. These firms might exhibit a more favorable employment performance and are simultaneously more active with respect to qualifying their workforce. Neglecting this relationship implies that the positive employment effect of the more innovative management of companies in the treatment group will be assigned erroneously to the treatment itself. In other words, the estimated treatment effect is biased upwards. It is straightforward to construct a counter-example in which the treatment effect would be biased downwards, e.g. by neglecting unobserved differences between companies in the treatment and the comparison group with respect to the dependency on a single customer. Hence, any credible evaluation attempt must address the problem of unobserved heterogeneity explicitly.

Unfortunately, our dataset (see also **section 4**) is limited with respect to the number of observations and does not allow to control for a sufficiently long history of pre-treatment outcomes. Furthermore, companies are in all likelihood much more volatile in their unobserved characteristics than individual workers. Therefore, controlling for pre-treatment outcomes alone seems to be no promising approach.

An alternative approach to circumvent the problem of unobserved heterogeneity is to model the participation decision right around the time it is made, i.e. in the cross-section. Therefore, we implement a control function approach (see HECKMAN (1979)) which is similar to an instrumental variable model (see VELLA AND VERBEEK (1999)). Additionally, this framework enables us to control for the level of the outcome measure at one point in time prior to treatment.

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The intuitive idea of this control function approach is to model the participation process as an economic decision problem by assuming that companies base their decision process on observable as well as unobservable (to the analyst) characteristics. Those firms participating in the measure although their observable characteristics would suggest the contrary must consequently display unobserved characteristics increasing their propensity to participate. This insight can be exploited to assess the sign and magnitude of a summary measure of unobserved heterogeneity, and to use it as an explanatory factor purging the estimate of interest from bias.

The central identification assumption necessary to proceed in such a way is to assume that unobserved differences between the treatment and the comparison group are fully reflected by an estimated correction term from an auxiliary estimation step (see also below). Furthermore, since the complete approach rests on a linear regression model, it is necessary to assume that there exists a linear relationship between the outcome measure and the explanatory variables and that the latter are strictly exogenous.

Finally, it is important to note that in control function approaches identification is either achieved by parametric assumptions or by employing an exclusion restriction into the two-step model. Such an exclusion restriction is comparable to an instrument in an instrumental variable approach. However, in such a framework the effect of an intervention is identified only if the treatment effect is constant for observation units with the same value of the covariates (see FLORENS ET AL. (2002) and IMBENS AND ANGRIST (1994)). In the case of heterogeneous treatment effects, i.e. the impact of the intervention varies with unobserved characteristics over the population, the mean effect of the intervention is identified for the sub-population of the so-called compliers only. That is,

for those individuals whose value of the treatment indicator changes in reaction to an exogenous change in the instrument[5].

In the case hand, one might think of the example of unobservable differences in the innovative capacity of the companies' management discussed above. If e.g. an exogenous change in the exclusion restriction changes the participation behavior of highly innovative companies only, the estimated treatment effect of the model represents the impact of participation in qualification programs for these highly innovative firms only. In other words, in this case we are not able to identify the average effect of treatment on a company randomly selected from the population.

However, since the homogeneity or heterogeneity of treatment effects across the population is unobservable, it is impossible to resolve this problem ultimately. For individual workers it seems plausible to argue that unobserved ability or motivation might be the source of heterogeneous treatment effects. By contrast, at the level of companies it is rather difficult to find convincing arguments for the source and direction of such heterogeneous treatment effects since for firms many potentially important characteristics are unobservable and might unfold an impact into different directions. Again, the dependency from a single customer which might be especially pronounced for the rather small enterprises in our sample might serve as a counter-example to the case of differences in innovative capacity of companies. Hence, in the following we will maintain the hypothesis of a homogenous treatment effect and come back to this issue in the discussion of the estimation results.

[5] This is also known as the concept of local average treatment effects (LATE; see IMBENS AND ANGRIST (1994)).

In more technical terms, we estimate a dummy treatment effect model. This model specifies a fixed treatment effect which captures the impact of the treatment on any observation unit randomly selected from the population. The ultimate aim of such models is to estimate the $(K\times 1)$-vector β and the scalar δ of the following multivariate linear regression model for companies indexed by $j = 1, .., N$,

$$(1) \quad y_j = x_j'\beta + \delta z_j + \varepsilon_j .$$

In this equation y_j denotes the outcome measure (in our case employment at the firm-level) and x_j is a $(K\times 1)$-vector of observable variables characterizing the company. z_j is a binary indicator variable taking the value of 1 if company j decided to participate in ESF-funded qualification measures and zero otherwise. The unknown parameter δ captures the (causal) effect of program participation and the vector β the impact of the confounding factors summarized in x. The random variable ε denotes the error term of the model. Typically, this model cannot be estimated consistently by OLS, since this error term is correlated with the unobservable factors influencing the participation decision, and thus with the program indicator z_j.

The strategy pursued here for circumventing this problem is to address the participation decision as an auxiliary first step. The decision to participate is modeled by equation (2) as

$$(2) \quad z_j^* = w_j'\gamma + u_j .$$

The latent variable z_j^* denotes the propensity to participate in ESF-funded qualification measures. This propensity is not directly observable. However, it is assumed to depend on

a set of observable firm characteristics w. The vector γ captures the effect of these characteristics and u denotes the error term of equation (2).

Observable to the analyst is only the actual decision of company j whether to participate in ESF-funded qualification measures denoted by z_j, where the relationship between z_j^* and z_j is

$$(3) \quad z_j = \begin{cases} 1 & \text{if } z_j^* > 0 \Leftrightarrow \text{participation} \\ 0 & \text{otherwise} \Leftrightarrow \text{no participation.} \end{cases}$$

Furthermore, we assume that the error terms ε and u are bivariate normally distributed with expected value zero and covariance matrix Σ, i.e.

$$(4) \quad \Sigma = \begin{bmatrix} \sigma & \rho \\ \rho & 1 \end{bmatrix}$$

For $\rho=0$ the covariance of both error terms is zero and both equations are uncorrelated. In that case, equation (1) can be estimated consistently by OLS. In general, this requirement is not fulfilled. The parameter λ (the so-called inverted Mills-Ratio) with

$$(5) \quad \lambda = \rho\sigma$$

captures the effect of self-selection. Following MADDALA (1983) the parameters β and δ can be estimated by the following two-step estimation procedure. The first step comprises the estimation of a probit model for equation (2), i.e.

$$(6) \quad \Pr(z_j = 1 \mid w_j) = \Phi(w_j\gamma)$$

where Φ denotes the cdf. of the standard normal distribution. This yields an estimate of the so-called hazard h_j for each observation unit, i.e. an estimate of the expected value that company j exceeds the threshold for participation in the program.

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$$(7)\quad \hat{h}_j = \begin{cases} \phi(w_j\hat{\gamma})/\Phi(w_j\hat{\gamma}) & for\ z_j = 1 \\ -\phi(w_j\hat{\gamma})/[1-\Phi(w_j\hat{\gamma})] & for\ z_j = 0 \end{cases}$$

ϕ denotes the density of a standard normally distributed random variable and $\hat{\gamma}$ is the estimated value of γ from equation (6). With this estimated hazard in hand, one can now extend the model from equation (1) and estimate it by OLS. That is, in the second step we estimate the following linear regression model

$$(8)\quad y_j = x_j\beta + \delta z_j + \lambda\hat{h}_j + \nu\,.$$

The parameter δ captures the effect of participation on the outcome measure y and the presence of $\hat{h}_j$ eliminates any correlation between $(x_j\ z_j)$ and ν. A statistically significant estimate for λ suggests that the treatment group is self-selected. The following section contains our empirical application of this approach utilizing a dataset at the firm level for Saxony.

4. Data and Results

The population of companies for the treatment group comprises firms in Saxony participating in ESF-funded training measures between June 1999 and December 2000 for their employees. The comparison group was drawn from the population of companies which did not participate in ESF-funded qualification during this period. That is, some companies in the comparison group implemented qualification measures for their employees without public funding. In sum, we have four groups of firms, (i) companies participating in ESF-funded qualification alone, (ii) companies combining ESF-funded and non-funded (commercial) qualification activities, (iii) companies utilizing only non-funded training opportunities for their employees and (iv) companies abstaining from any

qualification measure. The first two groups form the treatment group, whereas the comparison group consists of the latter two.

The final sample comprises 1,675 companies with complete information on all relevant variables, of which 38-40% (depending on the specific outcome variable) participated in ESF-funded qualification (see **Table A.1** in the appendix). 15-17% of these companies utilized ESF-funded qualification measures only, whereas approximately 23% combined funded with non-funded qualification opportunities. More than 30% of the companies in the final sample participated in non-funded qualification alone and around 30% did not engage in any form of training measures.

For the estimation of our model from **section 3** we utilize the following firm-specific employment variables as outcome measures:

- *Outcome measure (i)*: Number of employees subject to social security payments in 2001.
- *Outcome measure (ii)*: Total number of employees (including employees not subject to social security regulations) in 2001.

For the purpose of evaluating the effectiveness of ESF-funded qualification measures for employed workers, we perform several comparisons to provide answers to the following questions:

a) Did participating firms perform better in terms of employment compared to non-participants?

a1) Did participants utilizing ESF-funded measures *only* perform better than non-participants?

a2) Did participants *combining* ESF-funded and non-funded measures perform better than non-participants?

These questions concern the effectiveness of ESF-funded qualification measures (alone or together with non-funded activities) if participating companies are compared to *all* members of the comparison group. Since in the case at hand the comparison group comprises two different sub-groups of companies – those abstaining from qualification and those utilizing only non-funded opportunities – one might then be interested if the answers to question a) differ significantly once the comparison group is broken down into its sub-groups. From a policy point of view, the comparison with companies without any qualification activity is especially interesting since funding is targeted to small and medium sized enterprises with the explicit aim to support them in qualifying their workforce. This program focus is motivated by the idea that without funding these firms would abstain from training their employees. Therefore, the next set of questions comprises:

b) Did participants in ESF-funded qualification perform better than companies *abstaining* from any qualification measure for their workers?

b1) Did participants utilizing ESF-funded measures *only* perform better than companies abstaining from any qualification measure for their workers?

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b2) Did participants *combining* ESF-funded and non-funded measures perform better than companies abstaining from any qualification measure for their workers?

c) Did participants in ESF-funded qualification perform better than companies engaging solely in *non-funded* qualification measures?

c1) Did participants utilizing ESF-funded measures *only* perform better than companies engaging solely in non-funded qualification measures?

c2) Did participants *combining* ESF-funded and non-funded measures perform better than companies engaging solely in non-funded qualification measures?

Finally, for the purpose of implementing future funding programs it is interesting to know if there are differences in the performance of companies within the treatment group. That is, whether companies utilizing ESF-funded qualification measures alone perform better or worse than enterprises combining them with non-funded (commercial) training opportunities. Therefore, the final question addressed in this paper is:

d) Are there differences in the performance between the two sub-groups of participating companies?

Consequently, the set of comparisons conducted in this paper start with the *full sample* and compare the value of the outcome measure between companies participating in ESF-funded qualification measures (treatment group) and those which did not (comparison group). This provides an answer to question a). Since both treatment and comparison

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group comprise two different sub-groups of companies, we then break down this first comparison further by *restricting the sample*.

Specifically, in a next step we break down the treatment group and compare companies utilizing ESF-funded qualification alone and enterprises combining funded and non-funded training for their employees separately with *all* firms in the comparison group providing answers to questions a1) and a2). After that we break down the comparison group into the two sub-groups of companies without qualification and with only non-funded qualification, respectively. These two sub-groups are then compared in their employment development with the complete treatment group and separately with both sub-groups of the treatment group. This provides answers to questions b), b1), b2), c), c1) and c2). Finally, we compare the performance of both sub-groups of the treatment group directly as an answer to question d).

In sum, we consequently have the following *treatment* indicator variables:

- *ESF(-funded qualification)*: Dummy variable taking the value of 1 if company *j* participated in ESF-funded qualification measures; 0 otherwise.

This group comprises two different *sub-groups* of companies, i.e.

  - *Only ESF-funded qualification measure*: Dummy variable taking the value of 1 if company *j* participated in ESF-funded qualification measures *only*; 0 otherwise.

- *Combination with commercial qualification*: Dummy variable taking the value of 1 if company *j* participated in ESF-funded qualification measures *together* with programs by commercial providers; 0 otherwise.

Furthermore, the *comparison* group is indicated by:

- *Not-ESF*: Dummy variable taking the value of 1 if company *j* did not participate in ESF-funded qualification programs; 0 otherwise.

Again this group comprises two different *sub-groups*, i.e.

- *Only commercial qualification*: Dummy variable taking the value of 1 if company *j* participated in qualification programs by commercial providers *only*; 0 otherwise.
- *No qualification measures*: Dummy variable taking the value of 1 if company *j* did not participate in any qualification measure; 0 otherwise.

For all those comparisons several observable characteristics are jointly implemented as control variables for observed heterogeneity between the firms. Specifically, we have

- *Social security insured employment 1999*
- *Total employment 1999*
- *Newly established business*: Dummy variable taking on the value of 1 if company *j* has been established in 1996 or later; 0 otherwise.

- *Manufacturing Sector*: Dummy variable taking on the value on of 1 if company *j* belongs to the manufacturing sector; 0 otherwise.
- *Service Sector*: Dummy variable taking on the value of 1 if company *j* belongs to the service sector; 0 otherwise.
- *Craftsmen*: Dummy variable taking on the value of 1 if company *j* belongs to the crafts industry; 0 otherwise.
- *Self-employed*: Dummy variable taking on the value of 1 if company *j* belongs to the group of self-employed workers; 0 otherwise.
- *Independent company*: Dummy variable taking on the value of 1 if company *j* is an independent company, i.e. is not the subsidiary of a holding; 0 otherwise.
- *Increased investment in 1998/1999*: Dummy variable taking on the value of 1 if company *j* reported an increase of investment for 1998/1999; 0 otherwise.
- *Decreased investment in 1998/1999*: Dummy variable taking on the value of 1 if company *j* reported a decrease of investment for 1998/1999; 0 otherwise.

Finally, although the parameters of the model from **section 3** are in principle identified due to the non-linearity in the auxiliary estimation step, many applications demonstrate that robust estimation results require an exclusion restriction (see also VELLA (1998) for a survey). That is, we are searching for a variable that explains the participation decision process but does not impinge upon the outcome measure of equation (1). In the case at hand, we argue that this variable is

- *Innovations planned in future*: Dummy variable taking the value of 1 if company *j* reported to aim at the introduction of product, process or organizational innovations in 2002/2003; 0 otherwise.

This variable is assumed to have an impact on the decision of companies to participate in qualification measures for their employees but not on current outcomes. The idea behind this is that companies planning to innovate their production and/or organization processes in the near future do not adjust their employment in advance but are more likely to invest into the qualification level of their employees to cope with future challenges.

Clearly, since this is an identification assumption it is not testable and has to hold *a priori*. To be a valid exclusion restriction two conditions have to be met. Firstly, the excluded variable must have an impact on the participation decision and secondly, it must not be correlated with the variable(s) responsible for unobserved heterogeneity. In other words, the second condition requires that the excluded variable does not impinge upon the outcome measures in any other way than by the decision to participate in the intervention.

To support the hypothesis that companies which plan innovations in the future are more likely to invest into the human capital of their employees, **Table 3** reports the distribution of answers to the question whether a company plans to engage in future qualification activities for both realizations of the exclusion restrictions. These answers suggest that innovative companies are more likely to increase participation in trainings programs for their employees than their counterparts. More than 45% of those companies which plan future innovations also plan to increase qualification activities, compared to only around 28% of non-innovative enterprises.

Table 3: Future Qualification Activities of Companies

Planned future qualification activities	Innovations planned in future? No	Yes
Increasing participation	28.2%	45.2%
No change	60.9%	49.4%
Decreasing participation	10.9%	5.4%

Hence, we can be confident that the first condition is met. However, it is much more difficult to provide evidence that the second criterion is also fulfilled since this is an untestable identification assumption. Fortunately, from a set of OLS regressions of both outcome measures on all explanatory variables plus the exclusion restriction, it becomes transparent that the variable "innovations planned in future" has no significant direct impact on both outcomes[6]. This does, however, not necessarily mean that the exclusion restriction and the unobserved factor(s) are uncorrelated. In the case at hand, the problem is that companies are rather heterogeneous entities for which a variety of potentially important variables are unobservable. Clearly, if companies with a more favorable (in terms of employment development) set of unobserved characteristics are also more likely to implement product, process or organizational innovations, the second condition will be violated and the exclusion restriction is not valid.

However, systematic differences in unobserved firm characteristics imply that observable characteristics in the past should differ between both groups as well. For instance, if a specific group of companies displays a management with a higher innovative capacity and/or less dependency on a single customer, their success in terms of turnover, profits and/or investment should be higher. Fortunately, our data allows us to investigate this in more detail. **Table 4** reports the development of turnover, profits and investment for both

[6] Estimation results are available from the author upon request.

groups of firms in 1998, i.e. the year in which companies had to decide upon participation in qualification measures.

Table 4: Turnover, Profits and Investment of Companies in 1998/1999

	Innovations planned in future?			
	No		Yes	
	Mean	Standarddeviation	Mean	Standarddeviation
Turnover 1998/1999:				
Strong increase	0.085	0.278	0.122	0.328
Modest increase	0.344	0.475	0.408	0.492
No change	0.366	0.482	0.308	0.462
Modest decrease	0.157	0.364	0.117	0.322
Strong decrease	0.048	0.214	0.044	0.205
Profits 1998/1999:				
Very good	0.064	0.245	0.066	0.248
Good	0.279	0.449	0.315	0.465
Satisfactory	0.369	0.483	0.288	0.453
Enough to stay in market	0.225	0.418	0.249	0.433
Not sustainable in the long-run	0.046	0.210	0.073	0.261
Acute risk of bankruptcy	0.017	0.128	0.010	0.098
Investment 1998/1999:				
Strong increase	0.107	0.310	0.146	0.353
Modest increase	0.260	0.439	0.294	0.456
No change	0.537	0.499	0.481	0.500
Modest decrease	0.062	0.241	0.046	0.210
Strong decrease	0.034	0.181	0.034	0.181

From this table it becomes transparent that there are only minor differences in reported developments of these three variables. The largest difference is slightly higher than six percentage points. However, variation in answers within in each group is also rather high. A series of t-tests reveals that there are no statistically significant differences for all variables between both groups of companies at any sensible significance level. Thus, one could be confident that the exclusion restriction "innovations planned in future" is not systematically related with the source of unobserved heterogeneity.

Table A.1 in the appendix provides some descriptive statistics for our sample. From these figures it becomes transparent that both outcome measures did not change substantially

over time. However, the variation across companies was substantial. **Table 5** provides a summary of the estimation results. The full set of estimation results are reported in **Tables A.2-A.11** in the appendix. The left panel of **Table 5** contains the *raw differentials* (unconditional group means) of the several comparisons conducted in this paper. The *conditional differentials* are provided in the right panel. The results reported in this part of **Table 5** refer to the two-step estimation procedure if the self-selection coefficient is statistically significant and to the OLS results otherwise.

Table 5: Summary of Results

	RAW DIFFERENTIALS				CONDITIONAL DIFFERENTIALS			
	Outcome Measure (i)		Outcome Measure (ii)		Outcome Measure (i)		Outcome Measure (ii)	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
a) Comparison of participants with non-participants:								
(1) ESF vs. Not-ESF	6.97	1.56	6.47	1.41	35.67(*)	2.35	35.30(*)	2.40
a1) Participants in funded measures only								
(2) Only ESF-funded qualification vs. Not-ESF	-11.12	-3.90	-12.99	-4.69	39.70(*)	4.42	48.99(*)	4.68
a2) Participants in funded and non-funded measures								
(3) Combination ESF/comm.. vs. Not-ESF	23.88	4.17	26.49	4.40	25.24(*)	3.68	28.45(*)	3.94
b) Comparison of participants with non-participants abstaining from qualification:								
(4) ESF vs. no qualification	15.65	2.58	16.36	2.64	1.84	2.72	1.96	2.72
b1) Participants in funded measures only								
(5) Only ESF-funded qualify. vs. no qualification	-2.44	-1.43	-3.10	-1.87	1.43	2.17	0.79	1.26
b2) Participants in funded and non-funded measures								
(6) Combination ESF/comm.. vs. no qualification	31.38	4.01	35.05	4.30	2.37	2.68	2.94	3.06
c) Comparison of participants with non-participants engaging in non-funded qualification:								
(7) ESF vs. commercial qual.	-0.56	-0.09	-2.46	-0.39	0.47	0.70	0.44	0.57
c1) Participants in funded measures only								
(8) Only ESF-funded qual. vs. commercial qual.	-18.64	-5.20	-21.92	-6.25	33.01(*)	4.01	44.30(*)	4.26
c2) Participants in funded and non-funded measures								
(9) Combination ESF/comm.. vs. only commercial qual.	16.91	2.15	18.19	2.18	1.25	1.44	1.91	1.91
d) Comparison of both participant sub-groups:								
(10) Only ESF-funded qual. vs. combination ESF/comm.	-33.81	-3.13	-38.12	-3.61	-11.33(*)	-1.98	-1.20	-1.09

Notes: (*) Results of two-step estimation procedure since coefficient of self-selection is significant; OLS results otherwise.

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The estimation results demonstrate that there are substantial differences in both outcome measures between the different (sub-) groups of companies. Furthermore, it becomes transparent that controlling for observable characteristics of the companies changes the estimated differentials substantially in qualitative as well as quantitative terms. Our results suggest that participating in ESF-funded qualification measures exhibits a strong *positive* effect on both employment outcomes (see first row of **Table 5**). Furthermore, this positive treatment is highly significant for both sub-groups of the treatment group (rows (2) and (3)). However, it is larger for companies utilizing ESF-funded training only than for those firms which combined funded and non-funded qualification activities.

Once this comparison is broken down into the two sub-groups forming the comparison group, estimation results reveal that these positive effects stem from different sources. The fourth row of **Table 5** indicates a statistically significant *positive* effect of funded qualification compared to companies with *no* qualification activities. This effect is, however, considerably smaller in quantitative terms. Moreover, this small positive effect is driven by enterprises combining funded with non-funded training opportunities for their workforce (see row (6)), firms participating in ESF-funded qualification measures only do not perform significantly different from companies without qualification (see row (5)).

Furthermore, we observe no significant difference in both outcome measures between companies in the treatment group and enterprises utilizing non-funded training opportunities only (see row (7)). However, this zero effect is the weighted average of a statistically significant *positive* effect for companies utilizing *only* ESF-funded training and a zero effect for firms combining it with non-funded activities (see row (9)). Finally,

the last row of **Table 5** suggests that companies combining both forms of qualification opportunities slightly outperform firms which utilize ESF-funded qualification only for outcome measure (i). There is, however, no significant difference between both sub-groups of the treatment group for outcome measure (ii).

Estimation results for the first step decision equation suggest that newly established businesses and self-employed individuals are significantly more likely to participate in ESF-sponsored training for their employees, whereas the propensity to engage in qualification is significantly lower in the manufacturing sector and among craftsmen. With respect to the exclusion restriction the first step estimation results suggest that companies which plan innovations in the future are in general more likely to participate in qualification measures for their employees.

However, from Tables **A.2-A.11** it becomes transparent that the exclusion restriction is insignificant for five out of ten comparisons. In these cases, identification rests on parametric assumptions and, therefore, on rather shaky grounds. However, the exclusion restriction is significant for the following important comparisons:

- ESF vs. Not-ESF (weakly significant)
- Combination ESF/commercial vs. Not-ESF
- ESF vs. No qualification
- Only ESF vs. no qualification
- Combination ESF/commercial vs. no qualification

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Hence, especially the positive effect of participation for those companies which combined ESF-funded and non-funded measures is identified by the exclusion restriction. Additionally, for the identification of the overall program effect as well as for the comparison between companies relying on funded qualification only and firms which abstained form training measures we do not have to rely on parametric assumptions alone. Thus, the exclusion restriction turns out to be significant in the – from a policy perspective – most relevant cases.

Regarding the other covariates, the full set of estimation results reported in **Tables A.2-A.11** indicate that, unsurprisingly, the level of employment in 1999 has a positive impact on the value of outcome measures in 2001. Furthermore, in almost all regressions increased investment activities in 1998/1999 display a positive effect on employment in 2001 and companies in the manufacturing sector experience higher outcomes. Moreover, in some comparisons newly established businesses perform worse than more mature firms.

Finally, as already discussed in **section 3**, it is possible that the quantitatively rather large estimated effect of qualification measures in some comparisons which is identified by invoking the exclusion restriction "Innovations planned in future" might be the effect for a sub-population of companies only. It might reflect the benefits of investing into the human capital of their employees for those firms that are more optimistic with respect to their future prospects or more innovative at all. However, since such an interpretation requires the assumption of heterogeneous treatment effects (with respect to the source of unobserved heterogeneity), it is difficult to assess the extent to which our control function approach identifies the effect for the sub-group of the so-called compliers only. This

difficulty arises from the fact that at the level of companies many potentially important determinants of the outcome measures are unobservable.

5. Conclusions

This paper analyzed whether qualification programs for employed workers co-funded by the European Social Fund in Saxony and targeted to small and medium sized enterprises were effective. To this end, we performed several comparisons between participating and non-participating companies in a control function approach utilizing a unique firm-level dataset. In sum, the estimation results indicate a *positive* effect of participation in ESF-funded qualification measures on both employment outcomes and, therefore, suggest that in general the program was effective.

However, against the background of the explicit aim of the program to support firms that otherwise would have abstained from training their employees, our results suggest a more differentiated picture. Companies utilizing *only* ESF-funded qualification measures do *not* outperform firms abstaining from training their workforce, whereas enterprises combining ESF-funded with non-funded activities display higher employment levels than those without qualification.

Furthermore, the direct comparison of companies with ESF-funded activities alone and firms with combined training measures reveals that the latter perform better, at least with respect to social security insured employment. An explanation for this finding might be that firms combining both forms of training have to bear higher costs and are therefore more carefully in choosing the specific kind and content of qualification for their employees.

With respect to the implementation of future funding programs, our results suggest that training workers wile they are employed is a promising way to secure existing jobs. This implies that the program should be retained although – due to lacking data – we are not able to evaluate its cost-efficiency. However, the specific funding system of the ESF seems to be in need of reform. Specifically, it seems advisable for the design of future funding initiatives to provide incentives for participating companies to interact more intensively with the providers of qualification measures to ensure a more careful and problem-directed selection of the form and contents of training activities for their employees.

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Appendix

Table A.1: Descriptive Statistics

	Outcome Measure (i)		Outcome Measure (ii)	
	Mean	Standard-deviation	Mean	Standard-deviation
Social security insured employment 2001	24.86	87.94	-	-
Total employment 2001	-	-	26.95	94.83
Social security insured employment 1999	25.25	89.86	-	-
Total employment 1999	-	-	27.00	96.45
Only ESF-funded qualification measure	0.15	0.36	0.17	0.38
Combination with commercial qualification	0.23	0.42	0.23	0.42
Only commercial qualification	0.34	0.47	0.32	0.47
No qualification measures	0.29	0.46	0.29	0.45
Newly established business	0.13	0.34	0.13	0.34
Manufacturing sector	0.20	0.40	0.19	0.39
Service sector	0.44	0.50	0.45	0.50
Craftsmen	0.35	0.48	0.34	0.47
Self-employed	0.11	0.31	0.12	0.33
Independent company	0.93	0.25	0.93	0.25
Increased investment in 1998/1999	0.39	0.49	0.39	0.49
Decreased investment in 1998/1999	0.09	0.29	0.09	0.29
Innovations planned in future	0.22	0.42	0.21	0.41

Table A.2: Complete Results – ESF-funded Qualification vs. Not-ESF

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
Treatment Indicators:								
ESF-funded qualification	1.05	1.87	35.67	**2.35**	1.10	1.79	35.30	**2.40**
Control Variables:								
Newly established business	-0.09	-0.12	-6.74	**-2.08**	-0.35	-0.42	-7.15	**-2.21**
Manufacturing sector	4.11	**5.13**	11.95	**3.21**	4.29	**4.84**	12.31	**3.29**
Service sector	0.31	0.49	4.50	**2.08**	0.86	1.25	5.12	**2.37**
Craftsmen	-1.11	-1.77	1.21	0.80	-1.27	-1.84	0.74	0.52
Self-employed	0.09	0.10	-6.95	**-2.00**	-0.23	-0.25	-9.17	**-2.21**
Independent company	-0.55	-0.52	0.71	0.35	-2.57	**-2.19**	-1.44	-0.72
Increased investment in 1998/1999	3.14	**5.62**	1.42	1.13	3.10	**5.07**	1.68	1.43
Decreased investment in 1998/1999	-3.45	**-3.70**	-3.39	**-2.01**	-3.67	**-3.58**	-3.30	-1.95
Employment 1999	0.97	**325.70**	0.96	**145.07**	0.97	**321.26**	0.96	**155.36**
Constant	-0.91	-0.76	-16.44	**-2.31**	1.16	0.87	-14.41	**-2.05**
DECISION EQUATION:								
Innovations planned in future	-	-	0.13	1.70	-	-	0.13	1.68
Newly established business	-	-	0.52	**5.53**	-	-	0.55	**6.08**
Manufacturing sector	-	-	-0.69	**-6.76**	-	-	-0.71	**-7.16**
Service sector	-	-	-0.33	**-4.28**	-	-	-0.35	**-4.64**
Craftsmen	-	-	-0.18	**-2.26**	-	-	-0.15	**-2.03**
Self-employed	-	-	0.56	**5.15**	-	-	0.72	**7.19**
Independent company	-	-	-0.05	-0.38	-	-	-0.05	-0.35
Increased investment in 1998/1999	-	-	0.13	1.89	-	-	0.11	1.62
Decreased investment in 1998/1999	-	-	-0.01	-0.05	-	-	-0.03	-0.30
Employment 1999	-	-	0.00	**2.00**	-	-	0.00	**2.30**
Constant	-	-	-0.21	-1.40	-	-	-0.19	-1.30
Selection coefficient	-	-	-21.12	**-2.29**	-	-	-20.87	**-2.33**
Number of observations:	**1,675**				**1,811**			

Table A.3: Complete Results – Only ESF-funded Qualification vs. Not-ESF

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
				Treatment Indicators:				
Only ESF-funded qualification	1.38	**2.09**	39.70	**4.42**	0.63	0.90	48.99	**4.68**
				Control Variables:				
Newly established business	0.11	0.14	-6.26	**-2.97**	0.09	0.11	-8.62	**-3.32**
Manufacturing sector	3.42	**4.40**	9.45	**4.67**	3.29	3.86	11.16	**4.53**
Service sector	1.00	1.59	4.33	**3.06**	1.37	2.02	5.26	**3.19**
Craftsmen	-0.87	-1.44	0.24	0.20	-1.02	-1.55	0.33	0.23
Self-employed	0.77	0.82	-4.77	**-2.19**	0.60	0.61	-10.09	**-3.29**
Independent company	-0.53	-0.48	-1.13	-0.54	-0.84	-0.69	-2.70	-1.05
Increased investment in 1998/1999	2.34	**4.29**	2.38	**2.32**	2.09	3.52	2.71	**2.17**
Decreased investment in 1998/1999	-2.91	**-3.26**	-2.26	-1.34	-2.95	-3.05	-1.90	-0.93
Employment 1999	1.01	**146.99**	1.04	**70.25**	1.01	142.82	1.05	**62.17**
Constant	-1.99	-1.57	-11.47	**-3.54**	-1.34	-0.97	-12.91	**-3.39**
DECISION EQUATION:								
Innovations planned in future	-	-	0.12	1.20	-	-	0.11	1.17
Newly established business	-	-	0.51	**4.39**	-	-	0.54	**4.91**
Manufacturing sector	-	-	-0.67	**-4.80**	-	-	-0.67	**-5.02**
Service sector	-	-	-0.32	**-3.21**	-	-	-0.28	**-3.04**
Craftsmen	-	-	-0.11	-1.07	-	-	-0.10	-1.02
Self-employed	-	-	0.43	**3.09**	-	-	0.63	**5.07**
Independent company	-	-	0.09	0.45	-	-	0.19	0.98
Increased investment in 1998/1999	-	-	0.00	0.05	-	-	-0.03	-0.40
Decreased investment in 1998/1999	-	-	-0.06	-0.40	-	-	-0.08	-0.54
Employment 1999	-	-	-0.01	**-3.44**	-	-	-0.01	**-3.48**
Constant	-	-	-0.67	**-3.07**	-	-	-0.74	**-3.46**
Selection coefficient	-	-	-21.98	**-4.32**	-	-	-28.04	**-4.67**
Number of observations:	**1,319**				**1,423**			

Table A.4: Complete Results – Combination ESF/Commercial vs. Not-ESF

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
				Treatment Indicators:				
Combination with commercial qualifi.	1.79	**2.51**	25.24	**3.68**	2.46	**3.11**	28.45	**3.94**
				Control Variables:				
Newly established business	-0.51	-0.52	-3.69	**-2.33**	-0.79	-0.74	-4.64	**-2.63**
Manufacturing sector	4.34	**4.75**	7.75	**4.95**	4.88	**4.76**	8.92	**5.11**
Service sector	0.40	0.53	2.60	**2.18**	1.21	1.45	4.03	**3.00**
Craftsmen	-0.99	-1.35	1.22	1.05	-1.04	-1.28	1.16	0.94
Self-employed	-0.22	-0.20	-4.58	**-2.37**	-0.77	-0.65	-6.84	**-2.99**
Independent company	-0.32	-0.27	2.02	1.16	-2.34	-1.76	0.45	0.24
Increased investment in 1998/1999	3.32	**5.06**	1.15	1.06	3.40	**4.66**	1.12	0.98
Decreased investment in 1998/1999	-4.08	**-3.78**	-5.20	**-3.53**	-4.42	**-3.67**	-5.33	**-3.33**
Employment 1999	0.97	**301.34**	0.96	**183.66**	0.97	**295.44**	0.96	**181.21**
Constant	-1.37	-0.99	-10.35	**-3.25**	0.39	0.26	-9.90	**-2.85**
DECISION EQUATION:								
Innovations planned in future	-	-	0.21	**2.42**	-	-	0.22	**2.54**
Newly established business	-	-	0.41	**3.72**	-	-	0.45	**4.18**
Manufacturing sector	-	-	-0.57	**-4.93**	-	-	-0.59	**-5.29**
Service sector	-	-	-0.30	**-3.26**	-	-	-0.34	**-3.91**
Craftsmen	-	-	-0.29	**-3.17**	-	-	-0.25	**-2.83**
Self-employed	-	-	0.56	**4.53**	-	-	0.70	**5.94**
Independent company	-	-	-0.15	-1.02	-	-	-0.19	-1.36
Increased investment in 1998/1999	-	-	0.27	**3.42**	-	-	0.26	**3.32**
Decreased investment in 1998/1999	-	-	0.15	1.18	-	-	0.11	0.87
Employment 1999	-	-	0.00	**4.55**	-	-	0.00	**4.90**
Constant	-	-	-0.52	**-3.13**	-	-	-0.47	**-2.95**
Selection coefficient	-	-	-14.05	**-3.47**	-	-	-15.59	**-3.65**
Number of observations:			**1,397**				**1,478**	

Table A.5: Complete Results – ESF vs. No Qualification

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
Treatment Indicators:								
ESF-funded qualification	1.84	**2.72**	1.11	0.31	1.96	**2.72**	0.92	0.24
Control Variables:								
Newly established business	-0.39	-0.43	-0.27	-0.26	-0.63	-0.66	-0.45	-0.39
Manufacturing sector	3.81	**3.84**	3.63	**2.76**	4.11	**3.85**	3.85	**2.72**
Service sector	-0.47	-0.59	-0.53	-0.63	0.00	0.00	-0.10	-0.11
Craftsmen	-1.34	-1.69	-1.35	-1.71	-1.34	-1.60	-1.35	-1.62
Self-employed	-0.26	-0.25	-0.11	-0.09	-0.46	-0.45	-0.20	-0.14
Independent company	3.06	**2.25**	3.00	**2.15**	-0.32	-0.22	-0.42	-0.28
Increased investment in 1998/1999	3.16	**4.52**	3.24	**4.03**	3.20	**4.34**	3.31	**3.95**
Decreased investment in 1998/1999	-3.95	**-3.48**	-3.95	**-3.50**	-4.23	**-3.52**	-4.25	**-3.54**
Employment 1999	0.96	**304.09**	0.96	**281.55**	0.96	**309.11**	0.96	**284.46**
Constant	-4.23	**-2.76**	-3.77	-1.40	-1.03	-0.63	-0.36	-0.12
DECISION EQUATION:								
Innovations planned in future	-	-	0.38	**3.70**	-	-	0.37	**3.73**
Newly established business	-	-	0.47	**4.13**	-	-	0.54	**4.89**
Manufacturing sector	-	-	-0.80	**-6.48**	-	-	-0.83	**-6.84**
Service sector	-	-	-0.22	**-2.25**	-	-	-0.27	**-2.90**
Craftsmen	-	-	-0.02	-0.16	-	-	0.00	-0.03
Self-employed	-	-	0.69	**5.14**	-	-	0.85	**6.81**
Independent company	-	-	0.03	0.15	-	-	-0.02	-0.10
Increased investment in 1998/1999	-	-	0.26	**3.07**	-	-	0.24	**2.95**
Decreased investment in 1998/1999	-	-	-0.02	-0.16	-	-	-0.05	-0.42
Employment 1999	-	-	0.01	**4.75**	-	-	0.01	**4.85**
Constant	-	-	-0.08	-0.42	-	-	-0.01	-0.05
Selection coefficient	-	-	0.46	0.21	-	-	0.66	0.28
Number of observations:	**1,104**				**1,224**			

Table A.6: Complete Results – Only ESF-funded Qualification vs. No Qualification

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
				Treatment Indicators:				
Only ESF-funded qualification	1.43	**2.17**	-3.19	-0.55	0.79	1.26	-5.78	-0.96
				Control Variables:				
Newly established business	-0.61	-0.69	0.26	0.18	-0.51	-0.60	0.85	0.55
Manufacturing sector	3.38	**3.62**	2.33	1.43	3.40	**3.69**	1.83	1.06
Service sector	-0.01	-0.01	-0.35	-0.39	0.09	0.12	-0.39	-0.45
Craftsmen	-0.99	-1.33	-0.95	-1.24	-0.84	-1.17	-0.77	-1.01
Self-employed	0.25	0.24	1.23	0.75	0.24	0.25	2.09	1.06
Independent company	2.13	1.47	2.28	1.53	1.27	0.88	1.68	1.07
Increased investment in 1998/1999	2.57	**3.86**	2.78	**3.80**	2.48	**3.84**	2.69	**3.80**
Decreased investment in 1998/1999	-2.69	**-2.60**	-2.85	**-2.64**	-2.74	**-2.74**	-3.01	**-2.78**
Employment 1999	0.93	**63.36**	0.92	**59.71**	0.91	**68.51**	0.91	**64.34**
Constant	-3.04	-1.89	-1.50	-0.59	-1.76	-1.11	0.33	0.13
DECISION EQUATION:								
Innovations planned in future	-	-	0.35	**2.76**	-	-	0.34	**2.76**
Newly established business	-	-	0.51	**3.64**	-	-	0.57	**4.32**
Manufacturing sector	-	-	-0.76	**-4.74**	-	-	-0.79	**-5.05**
Service sector	-	-	-0.20	-1.65	-	-	-0.20	-1.80
Craftsmen	-	-	0.05	0.42	-	-	0.05	0.42
Self-employed	-	-	0.59	**3.53**	-	-	0.78	**5.23**
Independent company	-	-	0.08	0.33	-	-	0.16	0.69
Increased investment in 1998/1999	-	-	0.13	1.20	-	-	0.09	0.89
Decreased investment in 1998/1999	-	-	-0.08	-0.47	-	-	-0.11	-0.67
Employment 1999	-	-	0.00	-0.95	-	-	0.00	-0.43
Constant	-	-	-0.49	-1.89	-	-	-0.53	**-2.11**
Selection coefficient	-	-	2.82	0.80	-	-	4.02	1.10
Number of observations:			**748**				**836**	

Table A.7: Complete Results – Combination ESF/Commercial vs. No Qualification

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
Treatment Indicators:								
Combination with commercial qualifi.	2.37	**2.68**	4.33	1.26	2.94	**3.06**	6.87	1.85
Control Variables:								
Newly established business	-1.13	-0.90	-1.39	-1.05	-1.46	-1.07	-2.07	-1.41
Manufacturing sector	3.58	**2.92**	3.90	**2.91**	4.31	**3.21**	5.00	**3.36**
Service sector	-0.92	-0.89	-0.78	-0.73	-0.08	-0.08	0.31	0.27
Craftsmen	-1.48	-1.44	-1.35	-1.28	-1.41	-1.27	-1.18	-1.04
Self-employed	-0.80	-0.56	-1.24	-0.77	-1.35	-0.91	-2.41	-1.36
Independent company	2.16	1.33	2.46	1.45	-2.19	-1.24	-1.49	-0.79
Increased investment in 1998/1999	3.67	**4.03**	3.33	**3.08**	4.20	**4.26**	3.52	**3.02**
Decreased investment in 1998/1999	-4.52	**-3.15**	-4.62	**-3.21**	-4.97	**-3.19**	-5.12	**-3.27**
Employment 1999	0.96	**266.73**	0.96	**244.63**	0.97	**267.10**	0.96	**241.80**
Constant	-3.15	-1.69	-4.20	-1.63	0.60	0.30	-1.64	-0.57
DECISION EQUATION:								
Innovations planned in future	-	-	0.45	**3.94**	-	-	0.45	**4.01**
Newly established business	-	-	0.40	**2.96**	-	-	0.47	**3.64**
Manufacturing sector	-	-	-0.68	**-4.91**	-	-	-0.71	**-5.21**
Service sector	-	-	-0.19	-1.73	-	-	-0.27	**-2.59**
Craftsmen	-	-	-0.16	-1.41	-	-	-0.12	-1.16
Self-employed	-	-	0.72	**4.73**	-	-	0.86	**5.99**
Independent company	-	-	0.02	0.08	-	-	-0.07	-0.39
Increased investment in 1998/1999	-	-	0.41	**4.19**	-	-	0.40	**4.19**
Decreased investment in 1998/1999	-	-	0.13	0.86	-	-	0.08	0.55
Employment 1999	-	-	0.01	**6.01**	-	-	0.01	**6.18**
Constant	-	-	-0.50	**-2.35**	-	-	-0.41	**-1.98**
Selection coefficient	-	-	-1.27	-0.59	-	-	-2.54	-1.10
Number of observations:	**896**				**936**			

Table A.8: Complete Results – ESF vs. Only Commercial Qualification

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
	Treatment Indicators:							
ESF-funded qualification	0.47	0.70	-28.62	-1.13	0.44	0.57	-18.97	-1.02
	Control Variables:							
Newly established business	0.64	0.67	6.54	1.22	0.19	0.18	3.84	1.03
Manufacturing sector	4.45	**4.34**	-2.87	-0.44	4.58	3.91	-0.35	-0.07
Service sector	0.17	0.21	-4.35	-1.06	0.84	0.97	-1.96	-0.68
Craftsmen	-1.39	-1.78	-4.79	-1.49	-1.73	-1.95	-3.75	-1.69
Self-employed	0.04	0.04	4.63	1.07	-0.34	-0.30	3.53	0.89
Independent company	-2.08	-1.61	-2.45	-1.17	-4.47	-3.07	-4.46	**-2.50**
Increased investment in 1998/1999	3.25	**4.71**	3.36	**3.03**	3.12	4.01	2.97	**3.09**
Decreased investment in 1998/1999	-3.20	**-2.67**	-2.91	-1.50	-3.36	-2.47	-3.37	**-2.03**
Employment 1999	0.97	**307.17**	0.97	**184.44**	0.97	293.56	0.97	**232.11**
Constant	0.98	0.66	19.44	1.20	3.60	2.15	15.86	1.33
DECISION EQUATION:								
Innovations planned in future	-	-	-0.03	-0.36	-	-	-0.04	-0.50
Newly established business	-	-	0.56	**5.01**	-	-	0.54	**5.07**
Manufacturing sector	-	-	-0.66	**-5.55**	-	-	-0.67	**-5.78**
Service sector	-	-	-0.42	**-4.62**	-	-	-0.40	**-4.59**
Craftsmen	-	-	-0.31	**-3.49**	-	-	-0.28	**-3.28**
Self-employed	-	-	0.44	**3.51**	-	-	0.59	**4.99**
Independent company	-	-	-0.03	-0.21	-	-	0.00	0.02
Increased investment in 1998/1999	-	-	0.01	0.10	-	-	-0.02	-0.31
Decreased investment in 1998/1999	-	-	0.02	0.18	-	-	0.00	-0.03
Employment 1999	-	-	0.00	0.43	-	-	0.00	0.49
Constant	-	-	0.36	**2.20**	-	-	0.36	**2.28**
Selection coefficient	-	-	17.98	1.15	-	-	11.96	1.04
Number of observations:	**1,178**				**1,279**			

Table A.9: Complete Results – Only ESF-funded vs. Commercial Qualification

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
				Treatment Indicators:				
Only ESF-funded qualification	1.34	1.91	33.01	**4.01**	0.39	0.48	44.30	**4.26**
				Control Variables:				
Newly established business	1.54	1.63	-5.17	**-2.10**	1.30	1.21	-7.55	**-2.48**
Manufacturing sector	3.23	**3.29**	10.35	**4.00**	2.78	**2.40**	12.62	**3.78**
Service sector	1.28	1.71	5.83	**3.20**	1.64	1.89	7.09	**3.20**
Craftsmen	-0.81	-1.10	2.00	1.29	-1.26	-1.47	2.56	1.28
Self-employed	1.15	1.06	-2.81	-1.25	0.73	0.61	-7.92	**-2.47**
Independent company	-3.19	**-2.44**	-3.97	-1.62	-3.43	**-2.23**	-6.04	-1.85
Increased investment in 1998/1999	2.22	**3.40**	3.67	**2.88**	1.71	**2.22**	4.50	**2.60**
Decreased investment in 1998/1999	-2.15	-1.91	-1.87	-0.89	-2.00	-1.52	-1.33	-0.48
Employment 1999	1.03	**141.11**	1.07	**59.47**	1.02	**126.49**	1.09	**48.47**
Constant	-0.08	-0.05	-14.14	**-3.09**	1.01	0.57	-17.99	**-3.11**
DECISION EQUATION:								
Innovations planned in future	-	-	-0.06	-0.49	-	-	-0.07	-0.64
Newly established business	-	-	0.54	**3.87**	-	-	0.52	**3.97**
Manufacturing sector	-	-	-0.64	**-3.92**	-	-	-0.63	**-3.98**
Service sector	-	-	-0.45	**-3.85**	-	-	-0.38	**-3.43**
Craftsmen	-	-	-0.30	**-2.54**	-	-	-0.28	**-2.51**
Self-employed	-	-	0.27	1.66	-	-	0.47	**3.20**
Independent company	-	-	0.18	0.76	-	-	0.31	1.36
Increased investment in 1998/1999	-	-	-0.12	-1.19	-	-	-0.17	-1.69
Decreased investment in 1998/1999	-	-	-0.02	-0.12	-	-	-0.04	-0.24
Employment 1999	-	-	-0.01	**-4.72**	-	-	-0.01	**-4.98**
Constant	-	-	-0.06	-0.23	-	-	-0.15	-0.61
Selection coefficient	-	-	-19.31	**-3.92**	-	-	-26.92	**-4.31**
Number of observations:			**822**				**891**	

Table A.10: Complete Results – Combination ESF/Commercial vs. Only Commercial Qualification

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
Treatment Indicators:								
Combination with commercial qualifi.	1.25	1.44	74.71	1.81	1.91	1.91	73.66	**1.99**
Control Variables:								
Newly established business	0.35	0.28	-11.86	-1.51	-0.14	-0.10	-11.55	-1.67
Manufacturing sector	4.86	**3.88**	17.96	**2.18**	5.55	3.81	18.89	**2.43**
Service sector	0.33	0.32	10.77	1.64	1.42	1.24	11.73	1.94
Craftsmen	-1.25	-1.28	10.65	1.46	-1.50	-1.32	9.00	1.47
Self-employed	-0.34	-0.24	-12.98	-1.58	-1.02	-0.65	-16.15	-1.85
Independent company	-2.01	-1.31	5.33	0.86	-4.44	-2.54	2.47	0.44
Increased investment in 1998/1999	3.60	**4.12**	-1.32	-0.35	3.62	3.58	-0.40	-0.12
Decreased investment in 1998/1999	-4.22	**-2.79**	-10.60	-1.84	-4.58	-2.60	-9.46	-1.85
Employment 1999	0.97	**274.17**	0.95	**66.11**	0.97	258.86	0.95	**73.86**
Constant	0.43	0.24	-42.44	-1.72	2.58	1.26	-39.54	-1.78
DECISION EQUATION:								
Innovations planned in future	-	-	0.07	0.65	-	-	0.07	0.71
Newly established business	-	-	0.46	**3.44**	-	-	0.44	**3.49**
Manufacturing sector	-	-	-0.52	**-3.91**	-	-	-0.55	**-4.18**
Service sector	-	-	-0.39	**-3.69**	-	-	-0.40	**-3.91**
Craftsmen	-	-	-0.43	**-4.16**	-	-	-0.38	**-3.79**
Self-employed	-	-	0.47	**3.24**	-	-	0.59	**4.24**
Independent company	-	-	-0.20	-1.24	-	-	-0.20	-1.26
Increased investment in 1998/1999	-	-	0.17	1.91	-	-	0.14	1.62
Decreased investment in 1998/1999	-	-	0.23	1.45	-	-	0.17	1.13
Employment 1999	-	-	0.00	**1.97**	-	-	0.00	**2.29**
Constant	-	-	0.13	0.70	-	-	0.14	0.78
Selection coefficient	-	-	-45.24	-1.79	-	-	-44.21	-1.95
Number of observations:	**904**				**950**			

Table A.11: Complete Results – Only ESF-funded Qualification vs. Combination ESF/Commercial

	Outcome Measure (i)				Outcome Measure (ii)			
	OLS		Two-step procedure		OLS		Two-step procedure	
	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value	Coeff.	t-value
OUTCOME EQUATION:								
Treatment Indicators:								
Only ESF-funded qualification	-0.42	-0.41	-11.33	**-1.98**	-1.20	-1.09	-3.21	-0.55
Control Variables:								
Newly established business	0.43	0.34	1.29	0.89	-0.01	0.00	0.13	0.09
Manufacturing sector	3.72	**2.35**	2.63	1.47	4.12	**2.33**	3.96	**2.18**
Service sector	-1.75	-1.51	-1.69	-1.36	-0.69	-0.56	-0.60	-0.48
Craftsmen	-2.43	**-1.97**	-1.41	-0.99	-2.30	-1.72	-2.13	-1.49
Self-employed	-0.87	-0.61	-1.03	-0.67	-0.75	-0.51	-0.76	-0.52
Independent company	-0.05	-0.03	1.83	0.80	-5.81	**-2.72**	-5.38	**-2.18**
Increased investment in 1998/1999	3.68	**3.48**	2.24	1.65	3.99	**3.47**	3.70	**2.61**
Decreased investment in 1998/1999	-3.46	-1.93	-4.82	**-2.34**	-3.48	-1.76	-3.71	-1.79
Employment 1999	0.96	**264.62**	0.96	**225.77**	0.97	**257.09**	0.97	**235.89**
Constant	1.41	0.69	4.58	1.67	6.92	**3.05**	7.43	**2.75**
DECISION EQUATION:								
Innovations planned in future	-	-	-0.10	-0.77	-	-	-0.09	-0.78
Newly established business	-	-	0.10	0.78	-	-	0.08	0.66
Manufacturing sector	-	-	-0.10	-0.54	-	-	-0.03	-0.18
Service sector	-	-	-0.02	-0.13	-	-	0.11	0.98
Craftsmen	-	-	0.14	1.08	-	-	0.14	1.11
Self-employed	-	-	-0.18	-1.21	-	-	-0.15	-1.11
Independent company	-	-	0.37	1.52	-	-	0.48	**2.06**
Increased investment in 1998/1999	-	-	-0.32	**-2.83**	-	-	-0.34	**-3.22**
Decreased investment in 1998/1999	-	-	-0.32	-1.67	-	-	-0.29	-1.57
Employment 1999	-	-	-0.01	**-4.40**	-	-	-0.01	**-4.56**
Constant	-	-	-0.21	-0.81	-	-	-0.33	-1.33
Selection coefficient	-	-	6.97	**1.96**	-	-	1.29	0.35
Number of observations:	**633**				**718**			